Introduction

In 1966 the National Joint Advisory Council considered a general report on the extent of shift working and concluded that not enough was known about problems associated with the introduction of shift work. The Council felt that a survey of a number of firms which had recently introduced or attempted to introduce systems of shift work would be valuable, and at the Council's request such a survey was undertaken by the Ministry of Labour. The survey took the form of a series of case studies. The firms were visited by officers of the Ministry who spent an average of two to three days in each firm collecting data by means of planned interviews with senior and middle management, supervisors, shop stewards and operatives.

This report analyses the information obtained. With few exceptions, the firms surveyed were satisfied with the operation of their shift systems, and although most employees had reservations when the decision to introduce shift working was announced, they soon adapted themselves and worked well under the changed system. The survey showed the importance of a careful examination of questions relating to costs, maintenance, labour supply and market conditions, and of consulting workers and their representatives at an early stage, not only on matters such as pay and shift premiums, but also on the detailed working of the shift system to be introduced. Many of the firms found that the operation of a shift system involved continuing problems of supervision, communication, quality control, and provision of welfare facilities. In some of the firms where one or more of these matters received inadequate attention, difficulties arose.

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Firms studied

The survey covered 19 firms with a total labour force of over 30,000 persons. They ranged in size from 200 to 9,000 employees, with 10 employing more than 1,000 people. The continuous process industries, in which the nature of the work requires a continuous shift system, were excluded. Table I below shows the distribution by industry of the firms included in the survey.

TABLE I

Distribution by Industry of Firms Studied

Industry		No. of Firms
General Engineering		4
Food		3
Electrical Engineering		2
Non-ferrous Metals		1
Chemicals		1
Plastics		1
Printing		1
Data Processing		1
Textiles—		5
Cotton spinning and weaving	2	
Worsted spinning	1	
Synthetic yarns	1	
Carpet manufacture	1	
Total		19

All but three of the firms belonged to groups comprising general undertakings. The majority were situated in large towns or conurbations. In only one instance was unemployment relatively high in the locality. Generally speaking, there was considerable competition for labour in the areas where the other firms were located.

Of the 19 firms all but three had had experience of shift work before introducing the shift system studied during the survey. In three firms the particular system studied had proved unsuccessful, but these firms all had prior experience with shift work, and shift working was operating successfully in other parts of the undertaking.

Shift systems studied

In all, information was obtained in relation to the introduction of 23 shift systems. In four of the firms the introduction of two systems affecting different sections of the firm was studied. The 23 systems had been in operation for varying periods, 17 had been in operation for 5 years or less. The number of employees engaged on the shift systems studied ranged from 28 to over 2,000.

About threequarters of the firms operated more than one type of shift. However, the shift systems studied were variations of one or more of the following five broad types.

(*a*) Fixed or alternating, double-day shifts; usually 6 a.m to 2 p.m., and 2 p.m. to 10 p.m.

(*b*) Double-day shifts combined with a permanent night shift. This was used to give full 5-day coverage by employing women during mornings and afternoon, and men at night.

(*c*) Three-shift 'non-continuous' working, (i.e. giving continuous operation for five or six, but not for seven days a week) with rotation of shifts.

(*d*) Three-shift continuous working, using four crews of workers on rotating shifts, giving full seven day a week operation.

(*e*) Part-time shifts. These were usually provided for women working, for example, 5 p.m. to 10 p.m.

Under systems (*a*), (*b*) and (*c*) overtime was worked when needed at weekends.

In some of the firms a combination of one or more of the above patterns was worked. For example, maintenance workers were employed on a 3-shift non-continuous basis, while production workers were on double-day shifts. Elsewhere, continuous 3-shift working using four crews of maintenance workers was combined with 3-shift non-continuous working for production workers.

In every firm the shift system adopted had brought about a reduction of hours worked, either through eliminating overtime, or reducing the length of the basic working week. In half the firms the new weekly hours of shift workers were 37½, including a half-hour meal break. A few had 40 or 42 hour weeks. In one, a basic working week of 48 hours was in operation to meet the needs of three shift working with three crews at full strength from Monday to Friday, and at half-strength at the week-ends one half of each crew working on Saturday and the other on Sunday.

In general, the firms which had introduced 3-shift systems, had adopted initially the following shift rotation:— morning shift, then afternoon shift, then night shift. However, in all but one of these firms, the workers requested a change, usually to a 'mornings, nights, afternoons' rotation. This gave the

employees concerned a long weekend between their turns on the morning and the night shifts.

In some firms, double-day or part-time shifts were introduced to meet the convenience of female employees. A bakery employing a large number of women was in operation for 16 hours a day by using four shifts of four hours each, (6 a.m.–10 a.m., 10 a.m.–2 p.m., 2 p.m.–6 p.m., 6 p.m.–10 p.m.). A food factory operated two 5-hour shifts, and one 4-hour shift, to give a 14-hour day (7.30 a.m.–12.30 p.m., 12.25 p.m.–5.25 p.m., 5.20 p.m.–9.20 p.m.). In this latter firm, shifts were overlapped and the work break staggered to allow machinery to operate continuously.

Four systems involving night work for women were encountered in the course of the survey. In one of these a permanent night shift for women had been introduced, but was dropped after a six months trial period.

Reasons for adopting shift work

The firms surveyed had introduced their shift systems for a variety of technical and social reasons, differing of course in both nature and importance according to each firm's circumstances. In most cases there were several factors in the situation but the major reasons put forward by firms included the need to make greater use of machinery, to reduce overtime, to attract labour and to meet the requirements of special processes. At the same time, most firms hoped to achieve a reduction in unit costs.

Greater use of machinery

In two-thirds of the firms shift working had been introduced because of the installation of expensive new machinery. Shift working enabled management to obtain much higher production, and consequently a higher rate of return on capital invested. This was particularly important where techniques and methods in the industry were subject to rapid change. In two firms shift working systems had been introduced mainly to obtain maximum output from new plant before it became out-dated. Five firms gave as one of their reasons for introducing shift working, the need to raise output, with existing machinery: it was thought that shift work offered the simplest method of doing this where sufficient labour was available. Two of the three firms where the attempt to introduce a shift system failed were also trying to use it to deal with a sudden increase in demand.

Reduction of overtime

For about one third of the firms an important objective of the introduction of shift working was a reduction in excessive hours of work. The men in five firms had been regularly working 12 hour shifts, with, in some cases, weekend overtime as well.

Attraction of labour

Five of the firms used shift working as a means of tapping an additional source of labour. In four of these, part-time shifts or double-day shifts were introduced to attract women who were not available for normal day working.

Special process demands

Only four firms had introduced shift work to cope with the special demands of manufacturing processes. These firms were operating automatic machinery which it was costly or inconvenient to close down and restart. One firm had a heat treatment plant which was uneconomic to cool and reheat frequently. Another had installed machinery which demanded continuous operation for 168 hours per week.

Introducing shift work

One of the objects of the survey was to get information about action taken by managements once the decision to introduce shift work had been taken in principle. This can be grouped under four headings: preliminary discussions witb employees, trade union representatives, and, where necessary the Factory Inspectorate; adjustments to pay and hours of work; handling problems of labour supply and training; and providing facilities for shift workers.

Preliminary discussions

It has become almost axiomatic that managements should, from the outset, consult workers and their representatives when change in working conditions is proposed. In firms where workers were organised, the management had consulted full-time trade union officers, or sbop stewards. Although two firms bad anticipated opposition, union representatives generally did not oppose the introduction of sbift working and were prepared to discuss the practical arrangements.

Most of the firms also put their proposals direct to the workers involved, at meetings at which objections and difficulties could be raised. Three instances in which consulations of this type did not take place were where a new factory was establisbed or a new labour force recruited. These preliminary discussions had been of assistance to managements in planning the detailed working arrangements and all concerned felt that the discussions had helped to identify problems and to discuss that the arrangements were understood and accepted by the employees concerned. In some instances the consultations were formal and prolonged witb full discussion at all stages. In others an explanation of the proposed arrangements was given on a very informal basis.

One firm had a record of points raised during preliminary discussions between

the management and the employees concerned. They are worth quoting as examples of the questions about which workers are concerned:

"Will this new shift arrangement spoil weekends?"
"Would such a shift system interfere with seeing one's children?"
"Doesn't such a shift system interfere with sport?"
"How would people get to and from work at 6 o'clock in the morning?"
"How will this shift system affect maintenance?"
"Would hourly rates of pay be affected?"
"Why is management raising this question of shift working at this time?"
"How will these proposed changes affect day workers?"

Liaison with Factory Inspectorate

In planning the introduction of shift working, account must be taken of the restriction which the Factories Act imposes on the hours during which women of 18 years of age and over and young persons of both sexes under that age may be employed in factories. One effect of these restrictions is to prohibit the employment of women and young persons on shift work, unless an exemption is granted by the Ministry of Labour. An exemption is normally valid for a period of twelve months but requests for renewal are generally granted and in certain circumstances a permanent authorisation for day shifts can be obtained. Thirteen of the firms studied had made application for such exemption which in all cases was granted. In most cases, the firms had sought permission only to extend the hours of employment to 6.00 a.m. to 10.00 p.m. in order to enable a double day shift, running from 6.00 a.m. until 2.00 p.m. and from 2.00 p.m. to 10.00 p.m., to be worked.

A permanent authorisation to employ women and young persons on day shifts starting not earlier than 6.00 a.m. and finishing not later than 10 p.m. will be granted to firms provided a majority of the workpeople concerned vote by secret ballot in favour of the proposed shift system. Ballots were held in five firms. Four ballots produced a majority in favour of shift working, while in one ballot shift working was rejected. In this last case a second ballot resulted in acceptance of shift working after the management had held a series of meetings with their employees to deal with problems and queries. One other firm had set up a new factory on a shift working bases from the very start, all the workers being recruited for shift working, and was for this reason not required to hold a ballot. The Factory Inspector did recommend, however, that an extra 10 minutes break should be allowed in each shift, in addition to the half hour meal break.

The survey provided some evidence that where men's and women's work was inter-dependent, the men's hours were sometimes arranged to fit in with those permitted for the women by the Factories Act.

Adjustments to pay and hours of work

In all the firms studied, the introduction of shift work had resulted in shorter hours; in thirteen there were also longer periods of time off. Under all the systems studied employees received at least the same take-home pay for reduced hours of work, and in addition some received shift premiums of one kind or another. Higher premiums for night workers were the general rule. In rather

more than half the firms where shift working was successfully introduced, adjustments to pay and shift premiums were the subject of formal negotiations with the unions.

Labour supply problems

As shift work enables plant to be operated for longer periods, its introduction involves the recruitment of additional labour. In two thirds of the systems studied an increased labour force was in fact required. Of these some had been introduced specifically to attract labour which was not available for day work. The remaining systems operated in firms which had introduced shift work as a result of installing new machinery. Nearly half of these firms were able to redeploy labour from day work to cover double-day shifts without additional recruitment. In the case of one textile firm, the labour force fell from 250 day workers to a total of 170 workers on both morning and evening shifts.

On the whole, firms requiring additional labour were able to find it. The case studies demonstrated nevertheless the importance of the state of the labour market for the introduction of shift work. Questions such as: "Are additional workers needed?" "Will they be available at the right time and in the numbers required?" – had an important bearing on plans for the introduction of shift work and their implementation. This was seen particularly in the case of two of the schemes which had failed to get established. In one case double-day shift working was abandoned largely because of the total lack of skilled workers to man the extra shift. Because of recruitment difficulties, another scheme was limping along under severe difficulties; only alternating morning and night shifts were in operation instead of the three shift system which had been planned.

In some cases shift work assisted recruitment, particularly when the particular system had been chosen with recruitment problems in mind, but most firms experienced significant difficulties in recruiting for afternoon and night shifts. The work involved in recruitment was found to increase not only in relation to the numbers required but also in relation to matters such as the need for each successful applicant to be fitted into the shift system to his satisfaction and the management's.

The recruitment of labour for ten systems was phased over periods ranging from three months to several years. Recruitment was often staggered like this to coincide with the installation programme of new plant, but the gradual intake also reduced the problem of recruitment and training of the new workers. The disadvantages of unphased recruitment of large numbers can be seen in the experience of one of the firms studied. This was a light engineering company, which introduced a double-day shift system to meet an increased demand for their product. Because local unemployment was high it was possible to recruit all the additional operatives and maintenance workers immediately. But because all new labour was recruited at the one time, it was not possible to give the new recruits adequate training. This ready labour supply made it possible for the firm to double immediately the running time of 6 to 7 year old machinery, before the machinery could be overhauled. But as machine breakdowns increased the firm found that more maintenance had to be carried out during the shorter period when the machines were not running by maintenance men who, although skilled, were unfamiliar with the type of machine. Also, the large number of

new machine operators led to increases in the amount of scrap produced. The total effect can be judged by the fact that, during the first year of shift work, machine efficiency fell from 80% to 68%, and the management had severe doubts as to whether they would realise their objectives in introducing shift work.

Training

Although, in the case quoted above, no training had been carried out initially, the difficulties which were encountered led to the setting up of a training school to provide a 3–4 week introductory courses for operatives. This increase in training needs was fairly general. A course was also designed for maintenance fitters. The introduction of shift work necessitated some form of operative training to be carried out for 14 of the systems studied, and in all of these cases the training was given on the employer's premises. Where training of any length of time was needed, it was usually given during normal day-time hours of work but it is interesting to note that one engineering firm had been experimenting with operative training schools organised on a double-day shift basis.

Provision of facilities for shift workers

In a shift system the demand for welfare services within the factory will extend over a longer period. Although it is not usually possible to provide full welfare services for shift workers, particularly night workers, the following services were provided by the firms surveyed.

Canteen facilities. Six firms provided full canteen facilities for shift workers on evening or night shifts. Seven provided facilities for warming or cooking food, or vending machines selling hot snacks. The others provided a trolley service or tea-making facilities. One firm had a canteen service for night workers, but following a very low demand for hot meals this service was replaced by a vending machine. In contrast, another firm felt that 8-hour shift workers did not need a hot meal service at all, and provided vending machines only for 12-hour shift workers.

Transport. Difficulties associated with transport are often given as reasons for not starting shift working schemes. An earlier enquiry in the United Kingdom did not support this view and the firms studied in this survey did not experience significant transport problems. The seven factories which were situated in conurbations had adequate public transport facilities for shift workers. Outside the conurbations, one firm was well served by public transport, three made arrangements for a special service with local bus companies, and four provided company transport when necessary. Only one firm near a country town had experienced difficulties, but had overcome these by commencing the morning shift at 7 a.m. for those few workers who did not have cars.

Social activities. Only six firms had considered providing social activities for shift workers, and in these firms very little had been done, apart from arranging occasional dances. It may be interesting to note that in one firm which provided excellent general social facilities, the management felt that shift workers would not use special facilities because their pattern of living remained geared to the

traditional pattern of day work and consequently did not provide them. And in fact a finding which emerged from discussions with workers during the studies was that, in general, they were still trying to keep as much of their old pattern of life as possible. Nevertheless, the possibility still exists that as shift work is extended the demand for special social facilities will grow.

Medical services and health

Only four of the firms provided a comprehensive medical service at night. These employed male State Registered Nurses, operated night surgeries, and made available specialists such as opticians, chiropodists and physiotherapists by appointment. The other firms relied on workers, supervisors or security men who were qualified in first-aid, and even then, these services were not available all the time.

There were some complaints about effects on health from workers in most of the firms studied. No such complaints were made by employees of the one firm in an area of high unemployment and by women on part-time shifts. The complaints which were made assumed large proportions only when other features of the system were unsatisfactory and the workers were thought to be dissatisfied generally. In those conditions complaints tended to be made about the disturbance to family and social life and to health.

The experiences of medical staff in the firms surveyed may be illustrated from the comments of one of the works doctors interviewed. He pointed out that from time to time he did encounter adverse effects of shift work upon the health of workers (e.g. upset stomachs). He saw no reason why healthy, well-adjusted people could not tolerate shift work. He thought that the employee's general attitude towards shift work was a significant factor. He had found that workers who were reluctant to work shifts would find all sorts of reasons, including health, why they should not do so.

The effect of part-time shifts may be to reduce the demands made on workers. In the instance of the bakery mentioned earlier in this report, not only did a system of four shifts of four hours each meet the firm's labour requirements, it also lessened the very tiring effects of the hot working conditions upon employees.

Problems of operating shift work

In addition to the initial problems associated with the introduction of shift working the continuing day-to-day operation of a shift working system can give rise to certain difficulties. The case-studies showed that in most firms some of these were considerable. On the other hand, some of the problems which might have been expected had either not arisen to any appreciable extent, or if they had, were not due solely to the shift system. The survey looked particularly at the effect of shift working on labour turnover and absence, wage administration and holiday arrangements, supervision and communications and matters relating to production and costs.

Labour turnover

In slightly more than half of the firms studied, labour turnover increased following the introduction of shift work. However, this was attributed in only five cases to workers disliking shift working itself or to frictions and disagreements which arose between different shifts. In most of the other cases shift work and in particular part-time shifts had been introduced in order to attract married women, among whom a high turnover is to be expected. One textile firm employing women on both full and part-time shifts provided an analysis by shift of the reasons given by women for leaving. It was found that, over a 3-year period, 36 per cent of full-time workers left to take other jobs but only 12 per cent of morning, 8 per cent of afternoon and 2 per cent of evening part-time workers left for this reason. In contrast, only 18 per cent of full time workers who left, did so for domestic reasons; the corresponding figures for part-time shift workers were 35 per cent (morning), 45 per cent (afternoon) and 48 per cent (evening). Clearly, part-time workers put their homes and families first, and domestic difficulties caused them to leave because of the difficulty of making arrangements.

Absence

Although details relating to absence rates were not readily available, it was thought in 13 of the firms that neither casual nor sickness absence had increased as a result of introducing shift work. Absence had in fact tended to decrease in three systems where 12-hour shifts had been replaced by other shifts involving fewer hours. In one of these cases, sickness absence fell by two thirds.

Wage administration and holiday arrangements

Many of the systems studied were introduced in only certain sections of firms, but this did not seem to lead to difficulties in wage administration. But since staff workers were not employed on a shift basis employees' questions about wages were difficult to settle rapidly. They were also found to arise more frequently because the pay provisions relating to shift work systems sometimes made wage calculations difficult for workers to understand. The actual payment of wages did not raise many problems, although separate payment times usually had to be organised for each shift. It was interesting to note that in two firms where bonus systems were in operation, it had been found that when work overlapped two shifts, the incentive effect of the bonus was blunted.

In seven firms it was thought that shift work made holiday arrangements more difficult, particularly where night shifts were concerned. Also, where the firm did not shut down completely and holidays were staggered, the jobs of shift workers on holiday had to be covered by overtime, or by using workers from other parts of the plant or by recruiting temporary replacements. Workers on night shifts on Fridays found that it interfered with their week-end, and there was a tendency for workers to absent themselves from this shift.

Supervision and communications

The survey showed that one of the most difficult problems connected with the operation of a shift work system is to ensure proper management and

supervision. Should some managers at least be asked to work shifts? Should the number of supervisors be increased and if so by how much? On the one hand there is the cost of providing shift managers, and the problems of keeping them fully occupied and fitting shift work into their career structure; on the other hand, inadequate supervision can bring about the possible loss of quality control, the increased likelihood of errors in non-routine decisions, and heavier loads and longer hours for day managers.

Although 17 firms had employed additional supervisors to cope with shifts, it was found in all firms that a significantly greater burden was placed both on managers and supervisors. In none of the firms surveyed did managers work shifts but they nevertheless felt that the operation of a shift work system imposed heavy additional pressures on them. They had to maintain telephone contact with the works at night, and often had to call into the factory in the late evening or early morning. This extra work did not stem only from production problems; the Works Manager or Personnel Manager was often needed out of normal hours to deal with the employees' individual problems.

Where managers were not available during night shifts, the responsibility of night supervisors became correspondingly greater. Some welcomed this extra authority, and missed it when they were on day work. But several others regretted the lack of a high authority at night, and one said that he needed more training to enable him to determine priorities and decide whether repairs etc. should be attended to immediately or left until morning.

The effect of shift work on the actual quality of supervision was not clear. In one engineering firm, a cost controller said that supervision was "excessive between 8 a.m. and 5 p.m., and non-existent thereafter". But, by contrast, the manager of another firm found that several supervisors were under-employed at night, and reduced their number. He had acted on the principle that "a system which deals with three lots of people instead of one is that much more difficult", and accordingly had "multiplied everything by three" when his work introduced non-continuous 3-shift working. His experience showed this to have been unnecessary and expensive.

A related problem is the difficulty of maintaining good communications. This was mentioned in nine of the sixteen firms which had introduced shift working successfully. "Communications are the biggest problem all round" – was the view of one manager. Information and orders were not always transmitted adequately from top management to the individual shifts, or from one shift to the next, and a number of devices had been adopted to try to reduce this inadequacy. Some managers thought it advisable to call at the factory to visit the night shift and speak to the shift supervisor; and conversely, night shift supervisors sometimes came into the factory during the day to keep in touch with managers. These personal contacts were supplemented in at least five firms by written instructions duplicated for each shift and information was fed back from shift supervisors to managers by means of written reports or log books.

Log books were also used by six firms to maintain communications between shifts, and ten firms had stipulated that there should be a personal handover between shift supervisors, with an overlap of 15, 20 or 30 minutes. Informal meetings of management and shift foremen on Sundays were used by at least

two firms to improve communications, although such extra attendance cut further into the leisure time of those concerned.

Effects upon production and costs

Although it is frequently argued that shift working tends to be inflexible and makes it difficult to cope with peaks of production, this was not the general experience of the firms studied. All but one of the firms stressed that shift working had increased their capacity to spread additional work loads and made it easier to deal with urgent orders.

However, five firms said that shift work had brought problems of quality control, due to inadequate supervision, unsatisfactory labour on night shifts, and difficulties in tracing sources of poor quality work.

All firms agreed that shift work had led to an increased need for maintenance because new machinery was being run in, or because old machinery was operating for longer periods. This was usually met by employing additional maintenance staff and giving much more attention to planned and preventive maintenance, but, in some firms this course of action was taken only after increases in maintenance costs were found to be much higher than anticipated.

Although shift work was generally found to increase the costs of items such as recruitmen, training, maintenance, welfare facilities, lighting, etc., the overall effects of shift work upon costs did not emerge clearly from the survey. Most firms had not made detailed comparisons of costs with and without shift work. This does not mean, however, that they were unaware of the impact of shift work on the profitability and operation of their businesses. The managements of the firms surveyed had satisfied themselves that overall, and according to each firm's particular set of circumstances, shift work would be beneficial either in terms of lower unit costs, or in increased production to meet market or technical requirements; on the whole, the management were satisfied with the results. As an example of how relative costs can change, one firm found that depreciation as a proportion of total costs fell from 44% to 20%, and although labour costs rose from 30% to 52%, unit cost of production fell by about 30%.

Some reasons for failure of a shift system

The 23 shift systems studied have been discussed as one group, because the problems of introduction and operation were broadly similar. However, as mentioned at the beginning of this report, shift systems (four in all) introduced by three of the firms have proved unsuccessful. The more important reasons for these failures are set out below.

(1) Lack of adequate planning in the early stages. In one firm shift working was introduced during a major reorganisation of management.
(2) Lack of adequate consultation. Although the introduction of shift work had received official trade union backing, consultations with shop-floor workers were skimped. The workers voted decisively, in secret ballot, against shift work.

(3) Failure to study the local labour market in advance. In one area where unemployment was low and plenty of evening shift work was available, it was found impossible to recruit women for an afternoon shift. The firm had not informed itself of this position beforehand.
(4) The false assumption that young people would be prepared to forego evening and weekend leisure for the sake of increased pay.
(5) Lack of planning on the production side. In one firm modern machinery was introduced into the section without adequate steps being taken to improve the capacity of other departments to deal with the increased output.

Conclusions

Shift work can provide a means of making the best use of machinery, attracting extra labour, reducing overtime, or meeting peaks in demand. However, this success can be achieved only if the firm concerned takes into account certain factors.

Managements should examine the costs involved: depreciation, labour, material and fuel costs; the costs of medical, canteen, transport, and social services; the costs of extra maintenance and supervision, and the costs of overheads, including lighting, heating, building maintenance and insurance.

Managements should consider the state of the local labour market to determine if sufficient labour of the quality required is available, and what type of shift system would attract the labour required. The level of demand for the firm's product must be closely examined for although shift work can provide greater flexibility in meeting production requirements, the firm must be assured that demand will remain high enough to make use of the extra capacity created.

Initial steps

Managements should communicate their intention to introduce shift work to workers and unions as soon as possible. Open discussion at this stage will prevent rumours developing and help to produce a solution acceptable to both sides. The selection of a shift work system which fits as closely as possible with the needs and habits of workers is important. Sufficient time should be made available to allow workers to think over and react to management's proposals.

Managements will, of course, need to consider what compensation it is necessary to offer to employees in the form of shift premiums, shorter hours, or better working conditions. If women or young persons are involved, the provisions of the Factories Act must be observed, and the Factory Inspector will have to be consulted.

Shift organisation

If additional labour is required, recruitment should be phased, if possible, so that a large number of inexperienced workers do not have to be dealt with at once. Staggering the intake will also ease training arrangements.

Priority should usually be given to the recruitment of maintenance staff, or if old machinery is being used an overhaul may be required before shift-working starts, and a programme of planned, preventive maintenance should be prepared for both old and new machinery. If new plant is being installed, teething troubles may place greater demands on managers and workers.

Supervision requirements should be carefully reviewed, and thought given to the recruitment or promotion of shift supervisors, and the possible need to train them to cope with greater responsibilities on night shifts.

Shift work can create difficult problems of communication. Effective means must be provided for passing orders and information between managers on days and supervisors on shifts, and between supervisors and workers on separate shifts.

Finally, the experience of every firm studied pointed to the importance of allowing people time to become accustomed to changes in their working habits. Even where relations between management and workers were good and the latter were offered inducements in the form of shift premiums or reduced hours, the workers' initial reactions to shift proposals were unfavourable. After further discussions and explanations, but especially after the passage of time, most workers adapted themselves to shift working.

Case study examples

This report has dealt generally with the experience of the firms studied. It has not dealt comprehensively with the experience of any single firm. To fill this gap, a summary of the case study information obtained in each of two firms is presented below. Any of the firms studied would have been suitable for this purpose. Firm A has been selected because its change to a new shift system had to be made without any increases in the labour force or labour costs. Firm B provides an example of a change of a new shift system in one section of a general engineering firm.

Firm A

The firm manufactured plastics and at the time of the survey employed 824 persons. Only male employees were engaged on shift work, and of 525 male employees on the firm's payroll at the time of the study, 349 were engaged on shift work.

The firm drew its labour from a five-mile radius (some 70% of the labour force went home to lunch), and all employees recruited by the firm had to be trained. The level of local unemployment was 0·4%, a figure well below the national average, and there was strong competition between firms in the area for the available labour. Shift-working was not common in the area.

Reasons for change

A number of reasons led the firm to decide in 1964 to change from a 12-hour shift system operating for 5 days a week, to a continuous shift working system operating around the clock for seven days a week. The most important of these was a desire to reduce the number of hours worked by employees. Twelve hour shifts had been criticised by the industry's Joint Industrial Council and by the main trade union involved. Also, the firm's expensive processing machinery was liable to become obsolete quickly and the company were therefore anxious to use it to the full. There was a need to increase production, and for various reasons expansion of the existing plant was not possible.

The timing of management's decision to introduce gradually a new shift system was influenced by a need to install new equipment into one section in 1965. This new equipment had to be worked round the clock. This required a continuous 8-hour shift system, and the employees assigned to this work would be on a 42-hour working week. It was expected therefore that unions

would press for the introduction of these shorter working hours throughout the whole plant. Moreover, if a change were not made, there would be an immediate reaction from employees when it was known that the "take-home" pay of people working 42 hours per week in one section was roughly the same as that earned in other sections where 55½ hours were worked.

Costing. The Company's aim in introducing shift working was to avoid any significant increase in the total labour force or the total labour cost. Employees' "take-home" pay was to remain the same, in spite of the reduction in working hours. Some increase in costs was inevitable because of the need to recruit additional maintenance engineers. However, this was expected to be largely offset by the introduction of planned maintenance with a consequent decrease in break-downs.

Consultation with workers and unions

The management held a meeting with shop stewards in October, 1964, to discuss the problems associated with the introduction of a new shift working system and shorter working hours. A statement, which referred to this discussion and listed a number of questions and answers on points arising out of the proposed change, was then circulated to all employees. This was followed by an evening meeting between the management and all workers and their wives at the firm's Club House.

The management explained that because production problems varied between one department of the factory and another, each department would need to be studied separately in order to decide what shift arrangements could achieve the aims of (*a*) using the same number of men, (*b*) making maximum use of the plant, and (*c*) not increasing costs. It was agreed to set up departmental committees to examine the problem department by department with the help of the firm's industrial engineering section.

Each departmental committee consisted of the department supervisor as chairman, the shop steward from each of the two existing 12-hour shifts and four elected representatives from each shift. The industrial engineer also attended.

It was decided that decisions reached by departmental committees would apply only to their own departments. The management realised that this might produce a number of different shift systems but they were prepared to accept this. Once the whole factory had been converted to continuous shift working, it would be possible to work towards a greater increase of uniformity.

The conclusions arrived at by each committee were considered jointly by the management and union officials, and any modifications thought necessary were referred back to the departmental committees.

The departmental committees proved themselves well able to examine the problems involved and to put forward useful suggestions and counter proposals. Care was taken throughout the committee meetings not to impose management ideas, but rather to present basic facts and to give the committee the opportunity of working their way through to acceptable solutions. For example, when one committee was considering a number of shift systems presented by management, it took the best of those proposed and made improvements by altering

the shift cycle to give an increased amount of time off when rest days coincided with the weekend. A suggestion for a 7 a.m. start to overcome transport difficulties also came from a committee.

Finally, after 25 committee meetings spread over six months, one department was selected as a trial area for continuous 8-hour shift working. The system was introduced in the department in mid-1965, and a few months later into one other department.

Details of the shift system

The shift system introduced was a continuous 3-shift system, using four crews, and with shifts rotating over a 28-day cycle. The morning shift was from 7 a.m. to 2 p.m., the afternoon shift from 2 p.m. to 10 p.m.; and the night shift 10 p.m. to 7 a.m., with a quarter of an hour overlap between shifts. The pattern of working for one crew is set out below.

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	TOTAL
	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs
		Afternoon				Morning		
Week 1	8¼	8¼	8¼	—	—	7¼	7¼	39¼
			Morning					
Week 2	7¼	7¼	7¼	7¼	7¼	—	—	36¼
				Night				
Week 3	—	9¼	9¼	9¼	9¼	9¼	9¼	55¼
	Night				Afternoon			
Week 4	9¼	—	—	8¼	8¼	8¼	8¼	42¼

Recruitment and training. No additional recruitment was needed. The four crews consisted of existing employees. The introduction of mechanical handling aids and improved plant layout enabled them to be used more effectively.

No formal operator training scheme existed, training being largely carried out by the foreman. Existing and newly promoted supervisors were given the complete TWI programme to help them take full control of the plant at night and during weekends.

Welfare arrangements. Departmental canteens (a room in a corner of the shop), with vending machines selling snacks and hot drinks, were set up to enable workers to get served quickly during the shorter break allowed under the new shift system.

The main canteen was open only during the day. But, for the benefit of those workers still on 12-hour shifts, a vending machine selling hot meals had been installed. This was not in use at weekends when the 12-hour shifts were not operating because the management felt that the 8-hour shift workers did not need a hot meal service. This view was not shared by a number of the workers interviewed.

During the day a works surgery was operated by a Sister and trained nurse. Night medical services were provided by first-aid men trained from the shop floor and paid a weekly allowance of 5/-. [Although it was intended to have one trained first-aid man per shift, this had not been realised.]

Other than arranging for people who used the same car to travel to work, to be on the same shift, no special action was done to arrange transport. In the event of an emergency (e.g. of a worker's car broke down) a works car was sent to collect workers. As the great majority of the employees lived in the area, no real transport problems existed.

Effect of the shift system

Productivity. Productivity per worker was estimated by management to have increased by at least seven per cent.

As a result of the shift system, increased plant capacity due to longer machine running time was available. In certain sections where it had previously taken up to four days for full production to be restored after a closedown, "down-time" had been reduced by 10 to 20 per cent.

The shift system made it easier to meet customers' demands at short notice. On the other hand, the nature of the shift cycle had virtually abolished overtime, and sales and planning staff were forced to plan production schedules more carefully.

Supervision. At the time of the study, plant supervisors (i.e. those covering the whole plant) were not required to work continuous shifts. It was envisaged however that as the other departments changed over, supervisors would be put on to shift rotas. In preparation for this, planned job rotation had been introduced to familiarise all plant supervisors with departments other than their own.

Although the four crew system made it necessary to have four foremen instead of two, in each department these had been obtained by promoting assistant foremen who were no longer required because of the reduced number of workers per shift team.

Communication. The change to continuous shift working did not appear to have increased problems of communication. A ½ hour overlap took place between shifts and a log book was kept by the shift foreman. The management also thought that because workers had shorter hours under the new system and did not become so tired they paid more attention to information provided to them and were taking a greater interest in works affairs.

Wages, hours and holidays. Calculation of wages was simplified by a system of averaging out the hours worked over the 4-week cycle. The basic working hours were reduced by about 10 hours per week averaged over the 4-week cycle, and hourly rates of pay were increased. Adjustments were also made to compensate employees for increased responsibilities on machine-operation.

An allowance of 3d. per hour was introduced to compensate for shorter canteen breaks, but it was made clear that this would cease if a reversion to former practices occurred.

Holidays remained unchanged. At the annual holiday shut-down, however, employees on the three-shift system were able to take only two full weekends because of the incidence of shift duties, compared with three weekends under the 12 hour shift system.

Employee attitudes. One third of the workers interviewed said they had been in favour of the new system from the outset. All except two of the workers interviewed agreed that they now enjoyed a higher take-home pay. The two exceptions were people who had worked regular Saturday and Sunday overtime in the past. None regretted the elimination of overtime. Three of the workers interviewed regretted that weekend working interfered with their leisure activities, but recognised the advantages of the overall reduction in hours coupled with improved pay.

One shop steward put forward the view that the afternoon shift interfered most with social activities and was especially disliked at weekends.

One of the foremen said that he found it more difficult to sleep under the continuous shift system compared with the previous system when he worked for two consecutive weeks on days followed by two consecutive weeks on nights.

Of all the benefits offered by the continuous shift system, increased leisure time without reduction in pay was quoted by all workers interviewed as being the most significant.

Labour turnover, absence, sick absence. Labour turnover had decreased by 4% since the changeover, and absence had also decreased. Under the previous system, employees who worked overtime tended to stay out on Monday and Tuesday. There was some initial absence under the new system at weekends, but this ceased as soon as workers realised the effect this had on their pay.

There was 60% less sick-absence in the department on continuous shifts than in those on 12 hour shifts. This was thought to be due to shorter working hours and the inclusion in the shift rota of a 4 day weekend once in every 4 weeks.

Achievement of objectives

On the whole, the main objective of introducing eight-hour continuous shift working with labour costs comparable to the previous 12 hour system, was successfully achieved. There was an increased demand for the firm's products at the time when the new system was introduced, and the company's intention was to increase production capacity using existing machinery. In the event, demand slackened for the products of the trial department, and the contribution which the new system was capable of making to the expansion of productive capacity was not tested in practice. The management considered nevertheless, that a potential increase in capacity of one-third had been obtained without additional plant, buildings, or managerial staff. In market conditions which demanded full capacity, the management was confident of achieving a 30% saving in unit production costs.

Although there had been some initial resistance, there was general acceptance of the continuous shift working system. At the time of the survey, the manage-

ment were under pressure from operatives to speed up the introduction of the new system to other sections and departments, and recruitment for sections and departments still working 12-hour shifts was more difficult than for those on 8 hour shifts.

Firm B

This study concerned a change to a new shift system in one Section of a general engineering firm with a total employment strength of over 2,800 people. The Section in question was part of the firm's Heat Treatment Department, and had a labour force of about 30 men.

The firm had had extensive experience of shift work, and was located in an area where shift work was quite common. Unemployment in the area was low, and there was strong competition from other large engineering firms for the available labour.

Hours of work prior to change. In general the factory operated on a 2-shift day and night basis, rotating fortnightly, and before the change to the new system the Section studied operated a day shift from 8 a.m. to 5.30 p.m., and a night shift from 8 p.m. to 6 a.m.

In good market conditions the system was continuous. The gaps from 5.30 p.m. to 8 p.m., and from 6 a.m. to 8 a.m., were covered by overtime working. Weekend working was also covered by overtime.

Reasons for change

A change from 2-shift to 3-shift work stemmed from an increase in demand for the Section's product. Production requirements could not be met by further overtime and, perhaps due to pressure of work, absence rates had increased. The management suspected that an unofficial "holiday rota" was being operated.

Also the existing shift system required the heat treatment process to be shut down more frequently than desirable, and it took 3 to 4 days to reheat the furnaces. On a continuous 3-shift system the furnaces could be operated all the time, thus giving increased production and consistent quality.

Costing. Initial costing was directed at the cost of the increased labour force which would be required to man a continuous 3-shift system. It was found that the increase in wages would be approximately £3,000 per annum. However, this would be offset to a certain extent by increased production and a decrease in unit heat treatment costs. Additional savings, estimated at £2,000 per annum, were also expected from taking back into the factory some work of the Section which had been sub-contracted out.

Preliminary discussions

At the time the management decided to switch to the three shift continuous working, negotiations on pay bad recently begun, and pay and the proposed shift system were treated together. The topics dealt with in the negotiations included: incentive systems, lieu bonus rates, shift allowances, and the relationsbip between "take home" pay under the proposed new sbift system, the old system, and levels of pay in other Sections of the Heat Treatment Department.

In the negotiations, tbe company indicated its willingness to transfer workers not wisbing to work the 3-shift system to other work, but in fact, only two workers requested transfer.

Consultation with other bodies. The firm sought advice on 3-shift working from the Engineering Employers' Federation, and the Industrial Society. In addition, the firm's industrial engineers visited other factories in the area known to be operating the 3-shift system proposed.

Shift system introduced

Tbe system introduced in the Section was a 3-shift system, with three crews, which were at full strength from Monday to Friday. The week-end was covered continuously, but at balf strength, one half of each shift team taking a Saturday shift while the other half took a Sunday sbift. The duties rotated on a 6-week cycle.

The shifts from Monday to Friday rotated on a 'mornings, nights, afternoons' cycle. The morning shift started at 6.30 a.m. as opposed to the more traditional 6 a.m. start. Tbis was largely because of transport problems.

There were no fixed breaks during shifts. Operatives were allowed a half-hour break which they could take at any time convenient to furnace operation.

Welfare arrangements

Canteen. The firm's normal canteen service could not be used by workers on the new shift, because their half-hour meal break did not permit them to leave the shop floor. Two kiosks were therefore located on the shop floor, and provided snacks between the hours of 9 a.m. to 4.30 p.m. and 8 p.m. to 2 a.m. In addition tea, sugar, and milk were provided, hot water urns were installed on the shop floor, and hot and cold drinks were available from vending machines.

Transport. The firm was well catered for by local bus services and there were car parking facilities for 300 cars.

Medical facilities. The services of a Works Doctor were available for four half days per week at the firm's health centre. This very modern centre was staffed from Mondays to Fridays by a Sister-in-Cbarge, three female State Registered Nurses who worked from 8.30 a.m. to 5 p.m., and a male State Registered Nurse who worked from 8 p.m. to 7 a.m. One nurse was on duty on Saturday mornings from 8.30 a.m. to 1 p.m. The services of Security Staff trained in first-aid were available during those periods when the healtb centre was not manned.

One night a week the Doctor held a surgery for night workers, and ancillary services were provided at the centre by a National Health dentist, a physiotherapist, a radiographer, and an optician.

Recruitment and training. The 3-shift system required six additional furnace operators. A few operators were transferred from other departments, and the remainder were recruited from outside. No recruitment difficulties were experienced. The Employment Officer thought that applicants were attracted by the wage rates offered.

While one or two new operatives had been recruited with heat treatment experience, most had to be trained. Each new operative was given about two weeks day-time training before being put on night shift.

Effects of shift working

Supervision. The management thought that the supervisory problem had not been satisfactorily resolved, mainly because of the difficulty of finding sufficient experienced chargehands who were prepared to work shifts. The foreman himself felt his load was heavier as he had three groups of people to deal with instead of two; this involved dealing with telephone inquiries from the works while he was at home.

Wages and hours. Under the previous system average take-home pay for a 56 hour week had been £24 13s. 5d. With the change to the 3-shift system, this was increased to £25 12s. 5d.; this included one shilling above the nationally agreed shift allowance and was for 48 hours per week.

The National Agreement provided that 7½ hour shifts should be worked. However, because of the need to service the plant continuously, management paid for 8 hours working time in each shift without deduction for the half-hour meal break.

Towards the end of 1963, in response to a claim by the union that the pay structure did not provide a satisfactory differential for night workers, management increased the shift allowance paid over and above the nationally agreed shift allowance from 1/- to 1/4d. per hour worked between the hours of 10.30 p.m. to 6.30 a.m.

At the time of the study the final take home pay for the 3-shift operators over a 6-week shift cycle of six shifts per week averaged about £30 10s. 0d. Apart from the increases in shift allowances mentioned above, the remaining increases were due to national awards and adjustments to incentive schemes.

Holidays. There were no increased holidays as a result of the change. An annual shut down was in operation.

It was recognised that the lighting up of furnaces was an essential service prior to production. This meant that five men had to come in one shift early at the end of their holiday. Difficulties were found in manning this shift and it had been necessary to introduce an annual rotation. This applied both to Bank Holidays and annual holidays.

Absence and labour turnover. While no figures were available it was thought that there had been no increase in either sick absence or casual absence. If anything, absence had decreased as a result in tbe fall in working hours from 55–60 to 48 per week. Labour turnover was thought to be largely unaffected by the system.

Costs of the scheme. Tbe management was still in the process of collecting data on the effect or costs of the new shift system at the firm. The management expected, however, that there would be savings on furnace maintenance, as shutting down and re-heating, which caused most wear and tear, had been reduced to a minimum.

No increased costs were incurred for supervisory staff and the special canteen facilities did not involve an increase in costs. There were no changes in lighting and heating costs, and only minimal increases in training costs. However, a substantial saving had been made by taking back into the firm work which had previously had to be sub-contracted.

Attitudes to shift work

All workers interviewed who had transferred from the 2-shift to the 3-shift system agreed that they now enjoyed a higher hourly rate and worked fewer hours than before. The extra time off under the 3-shift system appealed to all workers except one who preferred the previous fortnightly rotation system.

The free issue of tea, milk, sugar, was greatly appreciated by the workers who preferred to brew their own tea rather than use the hot drink vending machines. But over half of the workers brought their own food and only occasionally used the kiosks which provided snacks.

The afternoon shift was strongly disliked by 75 per cent of those workers seen, because of the disruptive effect it had on their family life, particularly at weekends. The youngest man, aged 22, was no longer able to play regularly for his football team. One of the men's wives was said to find it irksome to prepare a late night meal for her husband coming home after the afternoon shift. Some wives were said to find the shift rota difficult to understand and to have difficulty in knowing when their husbands would be off duty.

Effect on health. The doctor's opinion was that normally healthy people could cope with shift work without suffering ill effects, although there were undoubtedly certain people who should not work shifts. He often saw workers who wanted to be taken off shift work because of upset stomachs. He believed the great majority of these cases to be genuine as the workers concerned usually accepted alternative jobs with less pay. He pointed out that there might also be other contributory factors; it could well be that workers who, for example, had domestic worries could find shift work upsetting.

From a physiological point of view, the doctor thought it preferable that shift systems rotate monthly rather than weekly to allow time for adjustment. In his view also, with the modern trends in house building, it was becoming increasingly difficult for shift workers to sleep undisturbed by noise during the day; and men who were tempted not to sleep following the night shift e.g. in order to take advantage of a fine day, might experience health troubles.

Half of the workers interviewed complained of stomach upsets which they attributed to the weekly shift rotation. One of these said he had never suffered from indigestion when working on a fortnightly rotation, and another said he did not feel like eating when on the night shift. Two of these workers also complained that they found it difficult to adjust their sleeping habits to the weekly rotation. The other half of the operatives interviewed said that they suffered no ill effects at all from working shifts.

Achievement of objectives

The three main objectives of increased production, better work flow, and a reduction of overtime, were all successfully achieved. Increased production came from using weekend time, and from a more even flow of work. The Section had previously been a bottleneck, but now the next department in the production flow was no longer kept waiting. Overall, management thought that the new shift system had been a success, and that without it the company could not have attained present production levels.

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MINISTRY OF LABOUR

Introduction of Shift Working

Survey made at the request of the National Joint Advisory Council

LONDON
HER MAJESTY'S STATIONERY OFFICE
1967

Foreword

by the Rt. Hon. R. Gunter, M.P., Minister of Labour

With advancing technology and the ever-present need to increase productivity, British industry has been turning more to the use of shift work. The number of manual workers engaged on shift work has grown by more than half during the last decade. This trend is expected to increase. Moreover, experience has shown that many firms already operating shifts will find it necessary to revise their shift systems to satisfy modern social and technical conditions.

The introduction of shift working is an important and complex process. The way in which this is done will very largely determine whether shift working is established successfully. It can also have wider effects on the operation of the enterprise as a whole. Information on practical problems associated with shift work can therefore be of real value to industry.

The following Report is an attempt to present such information. In doing so it refers to the benefits which firms found from shift working as well as to the problems they encountered but it does not discuss in detail the economic advantages which can accrue from shift working.

The Report has been produced at the request of my National Joint Advisory Council, on which sit representatives of the Confederation of British Industries, the Trades Union Congress and the Nationalised Industries. The idea of producing such a report was also welcomed by the National Economic Development Council. The report summarises the results of a series of investigations which Ministry of Labour officers carried out at the suggestion of the National Joint Advisory Council into the experience of a number of firms. It also contains an account of two of the detailed studies.

I hope that the Report will encourage those responsible in industry to pay greater attention to the planning of the introduction of shift work. This is essential so that management can know in advance the likely effects on production and costs, ensure through prior consulation that the employees concerned are fully aware of what is intended, and take account of their ideas and attitudes

I should like to thank the managements, trade union officers and employees who co-operated in the survey on which this report is based.

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